of the east Gulf states, and rain fell generally from the Ohio Valley to the Gulf coast. During the 17th the center disappeared off the North Carolina coast, and the rain area contracted to the Gulf and Atlantic coasts.

VII.—Appeared over the Saskatchewan Valley on the 17th, with pressure below 29.60. On that date the temperature rose 20° to 40° in the Northwest, and snow was reported in western Montana. During the 18th the center passed southeastward over Lake Superior, a marked rise in temperature occurred from the Lake region over the Southwestern States, and rain or snow fell in the north-central districts. By the evening of the 19th the center had advanced to the lower Saint Lawrence valley, and the rain area had extended over the interior of the Atlantic coast states.

VIII.—Appeared on the west Gulf coast the morning of the 19th and by the evening report had advanced to southern Alabama, with pressure below 29.70. On that date the temperature rose 10° to 16° on the middle Gulf coast, rain fell generally in the Southern and Southwestern States, and southwest to northwest gales prevailed along the middle and west Gulf coasts. By the morning of the 20th the center had moved off the North Carolina coast, with pressure below 29.50. Heavy rain fell generally east of the Mississippi and south of the Ohio rivers, and heavy north to west gales prevailed along the south Atlantic coast.

IX.—From the 21st to the 24th a storm area of great energy covered the middle and north Pacific coast states. During that period the rainfall was unusually heavy in California, exceptionally heavy snow fell in Oregon and Washington, and heavy gales of 50 to 60 miles per hour prevailed along the Pacific coast north of the 35th parallel. During the 24th the storm center apparently moved southeastward over Oregon, the temperature rose more than 20° in Colorado, the rain area extended over the middle and northern plateau regions, and a heavy wind and rain storm prevailed over Oregon and northern California.

Moving rapidly southeastward the center of disturbance reached the west Gulf states the evening of the 25th. On that date a marked rise in temperature occurred in the west Gulf and south Atlantic states, a heavy wind and snow storm set in over Kansas, and rain or snow fell generally in New England, the middle Atlantic states, the Lake region, the central valleys, and along the east Gulf coast.

During the 26th the center advanced to northern Florida, rain changed to snow in the east Gulf states, snow fell to the immediate Gulf coast, and high northeast winds with rain changing at night to sleet and snow set in over the south Atlantic states. During the 27th this low area passed northeastward off the south Atlantic coast. Heavy snow fell in the south Atlantic states, and high north to northwest winds prevailed on the Carolina coast.

X.—Appeared north of Washington on the 28th, with pressure below 29.60. On the 27th the temperature rose 20° to 30° on the northeast slope of the Rocky Mountains, and rain fell in the north Pacific coast states. On the 28th the temperature rose more than 20° over the eastern Saskatchewan valley, the rain area extended over the middle and northern plateau regions, and south to west gales of 60 to 66 miles per hour prevailed on the Washington coast. Moving rapidly southeastward the center reached Colorado the evening of the 29th. On that date a marked rise in temperature occurred in the central valleys, and snow fell generally over the Missouri Valley and the middle plateau region.

During the 30th the center advanced to southern Texas, the rain area extended from the middle Mississippi valley to New Mexico, and northwest gales prevailed over the southern plateau and southern Rocky Mountain regions. At the close of the month this low area occupied the lower Mississippi valley, with pressure below 29.50. On that date the rain area extended over the Gulf States and the Ohio Valley, a heavy thunderstorm was reported at Mobile, Ala., and high southwest to northwest winds prevailed along the middle and west Gulf coasts.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.		Duration.	Velocity per hour.	Maximum pressure change in 12 hours, maximum abnormal temperature change in 12 hours, and maximum wind velocity.								
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Station.	Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date.
High areas.		°	°	°	°	*Days.*	*Miles.*		*Inch.*			°					
I	1	42	85	40	81	1.0	10	Halifax, N. S.	.14	1	Knoxville, Tenn.	10	1	Hatteras, N. C	n.	20	2
II	1	52	113	36	75	4.5	22	Salt Lake City, Utah	.44	1	Pueblo, Colo.	23	1	Chicago, Ill	ne.	20	4
III	8	45	115	38	76	4.5	23	Grand Haven, Mich.	.48	8	Fort Buford, N. Dak	29	8	Havre, Mont	ne.	34	8
IV	19	52	114	37	77	2.0	50	Hatteras, N. C	.70	20	Huron, S. Dak	29	18	Amarillo, Tex.	n.	34	19
V	21	52	112	34	88	2.0	37	Swift Current, N. W. T.	.70	21	Swift Current, N. W. T.	26	21	Key West, Fla	n.	18	23
V*a*	22	51	104	33	81	3.0	26	do	.70	21	St. Vincent, Minn.	11	22	do	n.	22	24
VI	24	53	118	40	97	2.0	31	Fort Smith, Ark.	.54	26	Palestine, Tex.	34	26	Amarillo, Tex	n.	48	26
VI*a*	26	52	103	32	76	5.0	23	Calgary, N. W. T	.32	27	Green Bay, Wis	13	27	Hatteras, N. C	n.	18	29
Mean						3.0	28		.50			22				27	
Low areas.									Fall.			Rise.					
I	1	45	109	45	77	2.0	35	Winnipeg, Man	.34	1	Cincinnati, Ohio	20	3	Lander, Wyo	sw.	48	1
I*a*	1	37	98	45	77	1.5	36	Columbus, Ohio	.24	2	do	20	3	Cleveland, Ohio	nw.	36	2
II	3	48	125	45	73	3.5	35	Albany, N. Y.	.38	6	Qu'Appelle, N. W. T	24	3	Fort Canby, Wash	s.	66	1
III	6	32	100	48	80	2.5	26	Saugeen, Ont	.54	7	Erie, Pa	20	7	Chicago, Ill	sw.	50	7
IV	10	32	115	44	81	3.5	30	Detroit, Mich.	.46	13	San Antonio, Tex	27	12	Buffalo, N. Y	sw.	48	14
V	12	53	114	52	100	1.5	18	Medicine Hat, N. W. T.	.34	12	Havre, Mont	30	12	Valentine, Nebr.	nw.	26	13
VI	15	27	98	36	75	1.5	42	Vicksburg, Miss.	.24	16	Mobile, Ala.	11	16	Galveston, Tex.	e.	26	15
VII	17	54	105	49	68	2.5	32	Moorhead, Minn	.64	17	Moorhead, Minn.	32	17	Chicago, Ill	sw.	40	18
VIII	19	30	95	36	74	1.0	54	Hatteras, N. C	.46	20	Galveston, Tex	18	19	Kittyhawk, N. C.	n.	56	20
IX	24	47	124	30	82	2.5	45	Norfolk, Va	.48	25	San Antonio, Tex	19	25	Fort Canby, Wash.	se.	67	24
X	28	51	122	33	91	3.0	37	Meridian, Miss.	.50	31	Pierre, S. Dak	24	29	Tatoosh Island, Wash	w.	66	28
Mean						2.3	35		.42			22				48	

NORTH ATLANTIC STORMS FOR DECEMBER, 1892.

[*Pressure in inches and millimeters; wind-force by Beaufort scale.*]

The paths of storms that appeared over the west part of the north Atlantic Ocean during December, 1892, are shown on Chart I. These paths have been determined from reports of observations by shipmasters received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

The normal distribution of pressure over the North Atlantic in December shows a belt of high pressure, with values above 30.10 (764), stretching across the ocean between the 30th and 40th parallels. From this belt there is a marked gradient to Iceland and southern Greenland, where the pressure is below 29.50 (749). There is usually an increase of pressure over the southern and eastern parts of the ocean in December. Between the Azores and the coast of the United States, and thence northward, there is a decrease of pressure, the decrease being most marked within the Iceland area of low pressure, where it exceeds .20.

The storms of December usually follow two principal tracks which diverge from the main continental track east of Newfoundland, one running directly into the Iceland low area, the other skirting the southern quadrants of the Iceland low area and passing north of the British Isles. The average velocity of North Atlantic storms in December is about 21 statute miles per hour, and an average of 3 storms traverse the ocean from the American to the European coasts in that month.

The severest storms of December, 1892, prevailed over mid-ocean from the 13th to 17th and 20th to 23d. Six storms advanced eastward from the American coast, 2 of which reached European waters. The following is a description of the storms that appeared during the month:

The month opened with low area XV*a* for November central south of western Nova Scotia. By the 2d this storm had passed slowly eastward, attended by south to west gales of force 10 to 11 between the 50th and 56th meridians. The morning of the 3d the storm was central south of Newfoundland, with pressure about 29.40 (747), and by the morning of the 4th had united east of Newfoundland with low area I which had advanced from the westward. From that position the storm apparently recurved westward and the morning of the 5th was central south of Newfoundland. Moving northeastward the storm disappeared north of the region of observation after the 7th.

From the 2d to the 4th a storm of moderate strength apparently passed eastward over the British Isles. On the 7th low area II passed south of east over Nova Scotia, and the morning of the 8th was central off the south edge of the Grand Banks, after which it disappeared. On the 12th a storm appeared north of the Grand Banks and passed eastward to mid-ocean by the 15th, where it remained nearly stationary until the 17th attended by southwest to northwest gales of force 10 to 12, after which it apparently passed north of the British Isles. The passage of a storm over or north of the British Isles was indicated by reports of the 10th to 12th.

During the 17th low area VI passed off the North Carolina coast, and the morning of the 17th was central east of the Grand Banks, with pressure about 28.80 (731), and northwest gales of force 9 to 11. By the 19th the storm had changed position but slightly and southwest winds of hurricane force were encountered near the 40th meridian. From the 20th to the 23d this storm occupied mid-ocean, with pressure falling to 28.20 (716) on the 22d and to 28.30 (719) on the 23d, and westerly gales of force 9 to 11 between the 30th and 40th meridians, after which it apparently shifted position to the westward and united with an area of low pressure which appeared over the Gulf of Saint Lawrence on the 24th.

From the 25th to the 27th the pressure continued very low over and near Newfoundland, barometer readings below 29.00 (736) being reported on the 25th and 26th. By the 28th this storm had advanced to mid-ocean, where it remained nearly stationary until the 29th. On the 30th it occupied the ocean west of Ireland, and at the close of the month was apparently central over the Bay of Biscay, with pressure below 29.50 (749). On the 27th low area IX moved northeastward off the south Atlantic coast, with pressure below 29.50 (749), and northeast gales of force 9. The morning of the 28th the storm was north of Bermuda. By the 29th it had reached mid-ocean, and by the 30th it had united with the storm that occupied the ocean west of Ireland.

OCEAN ICE IN DECEMBER.

Arctic ice was not reported for December, 1892. In December, 1882, 1883, 1884, 1886, and 1888 no Arctic ice was reported near Newfoundland and the Grand Banks. In 1885 several icebergs were observed off the Newfoundland coast the early part of the month. In 1887 a small iceberg was reported in N. 46° 10′, W. 47° 28′ on the 26th, and a small iceberg in N. 48° 20′, W. 48° 40′ on the 28th. In 1889 large quantities of Arctic ice were reported over and near the Grand Banks. In 1890 a large berg was observed in N. 49° 39′, W. 47° 50′ on the 13th.

OCEAN FOG IN NOVEMBER.

The limits of fog belts west of the 40th meridian, as determined by reports of shipmasters, are shown on Chart I by dotted shading. East of the 55th meridian fog was reported on 10 dates; between the 55th and 65th meridians on 3 dates; and west of the 65th meridian on 4 dates. Compared with the corresponding month of the last 5 years the dates of occurrence of fog east of the 55th meridian numbered 6 more than the average; and west of the 55th meridian 2 less than the average. The occurrence of fog along the steamship tracks west of the 40th meridian and at stations of the Weather Bureau on the New England and middle Atlantic coasts generally attended the approach or passage of general storms.

TEMPERATURE OF THE AIR (expressed in degrees Fahrenheit).

The distribution of mean temperature over the United States and Canada for December, 1892, is exhibited on Chart II by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the temperature is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Weather Bureau represents the mean of the maximum and minimum temperatures.

Over the greater part of the Florida Peninsula and in the extreme lower Rio Grande valley the mean temperature was above 60. It was above 55 along the immediate Gulf coast and in the Colorado Desert, California, and the mean readings were above 50 over the southern half of the Gulf States, in the lower Colorado and Gila valleys, and along the California coast from San Francisco southward. The mean temperature was lowest in the region north of North Dakota, where it was below zero. It was below 10 over the northern half of Minnesota, in North Dakota, northeastern Montana, and at Climax, Colo., and the mean readings were below 20 over northern New England, Upper Michigan, Wisconsin, Iowa, and north of a line traced from east-central Nebraska to northwestern Montana. The mean temperature was also below 20 in the middle Rocky Mountain region.